

High Performance Drive Electronics for MEMS Pirani Vacuum Gauges



Completed Technology Project (2016 - 2017)

Project Introduction

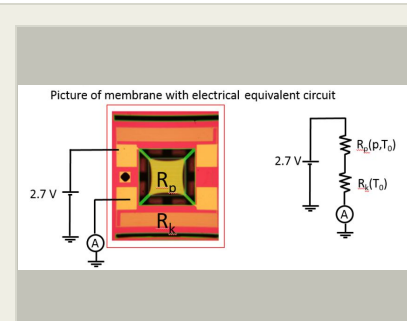
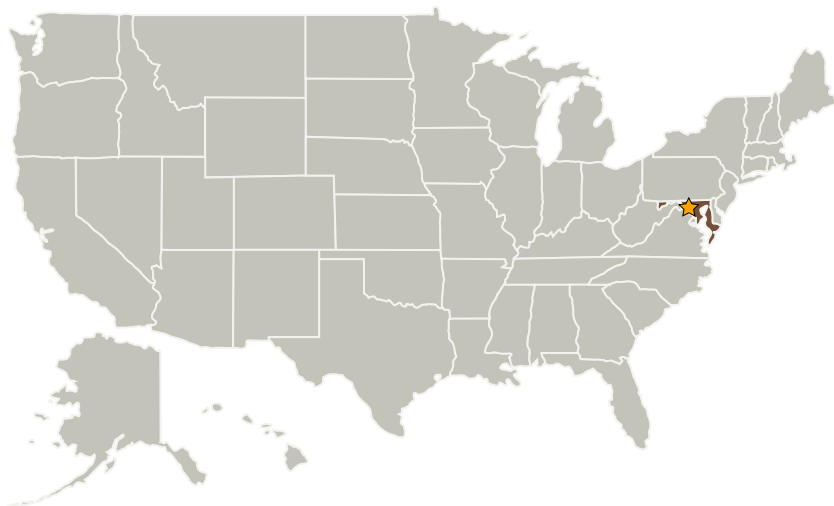
The proposed project is to develop a high performance drive electronics circuit for MEMS Pirani pressure gauges. The proposed drive electronics circuit will be developed based on the constant voltage principle for high performance pressure measurements that enables real-time in-situ measurements without a need for precise tuning of its frequency response. The constant voltage operation will provide a constant bandwidth control, higher signal-to-noise ratio, guaranteed circuit stability regardless of gauge cable length and longer cable length without affecting the frequency response.

The objective of this project is to develop a high performance drive electronics circuit for MEMS Pirani pressure gauges. The proposed drive electronics circuit will be developed based on the constant voltage principle for high performance pressure measurements that enables real-time in-situ measurements. The constant voltage approach provides many benefits over the conventional approach.

Anticipated Benefits

The ultimate application of the proposed MEMS Pirani pressure gauge with the drive electronics is for instrument control and response time improvement.

Primary U.S. Work Locations and Key Partners



Pirani Pressure Sensor

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Project Transitions

October 2016: Project Start

 September 2017: Closed out

Closeout Summary: The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services. Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry. The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies. If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. <http://techport.nasa.gov/help>

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

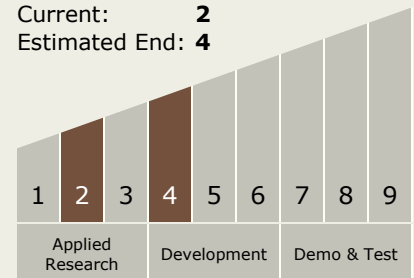
Peter M Hughes

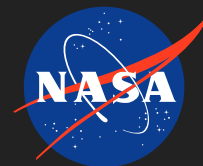
Project Managers:Charles D Butler
Brook Lakew**Principal Investigator:**

Joseph C Church

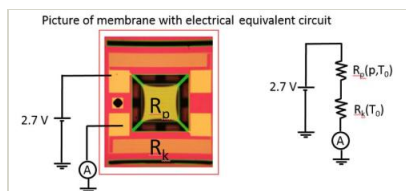
Technology Maturity (TRL)

Start: 2
Current: 2
Estimated End: 4





Images



Pirani Pressure Sensor

Pirani Pressure Sensor

(<https://techport.nasa.gov/image/26330>)

Project Website:

<http://aetd.gsfc.nasa.gov/>

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.2 Atomic and Molecular Species Assessment

Target Destinations

The Moon, Mars, Others Inside the Solar System